Similarity in physical activity

(Macdonald-Wallis. Jago. & Sterne. 2012; Sawka et al.. 2014)

Similarity in physical activity

Selection

Influence

(Steglich. Snijders. & Pearson. 2010)

SABM: Self reported PA

de la Haye. et al. (2011)

- Secondary school. grade 8 (N= 222. Age: 13.7)
- Self-report average weekly hours of MVPA [1-7]
- Two network of the schools
- Sex; PA-cognitions; ethnicity; pocket money
- Influence effect.
- selection not significant when cognitions are added

Shoham et al. (2012)

- ADD health data (N = 1775. Age: 16.5)
- Self-reported active sports last week [0-3]
- Two separate networks
- Sex; grade; BMI; screen; ethnicity; money
- Influence effect
- Selection in one schools

Simpkins et al. (2013)

- ADD health data
- Self-reported active sports last week [0-3]
- Two separate networks
- Sex; grade; BMI; race; self-esteem; breakfast; parents; co-participation
- Selection and Influence effects

Long et al. (2017)

- ADD health data
- Self-reported active sports last week [0-3]
- Two separate networks
- Sex; grade; race; parental education; alcohol use
- Influence effect.
- No selection effect

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- Two separate networks
- Sex; grade; race; parental education; alcohol use
- Influence effect.
- No selection effect

SABM: objective PA

Gesell. et al. (2012)

- Two after school programs (N = 81. Age: 7.96)
- MVPA measured by Actigraph
- Sex; Age; Obesity; race
- Influence effect
- No selection effect after cov's are added

Strong evidence of influence of peers on adolescents physical activity

Selection effects diminish after inclusion of control variables

my movez ≫ data

Longitudinal project investigating healthy lifestyles in youth

MyMovez wearable lab

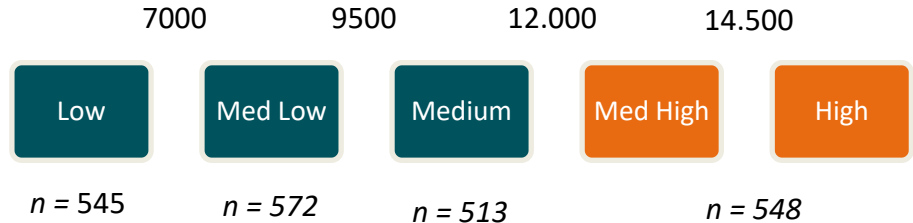Longitudinal measures of:
    Physical activity
    Sociometrics

https://easy.dans.knaw.nl/ui/datasets/id/easy-dataset:155345

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Physical Activity

Number of steps per day.

Averaged per wave: Mean steps = 9.669 (SD = 2.872)

RSiena requires categories

7000	9500	12.000	14.500

Low	Med Low	Medium	Med High	High

n = 545 n = 572 n = 513 n = 548
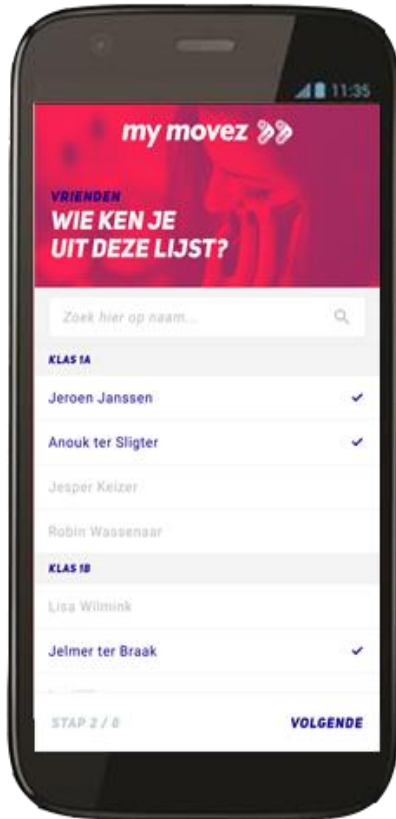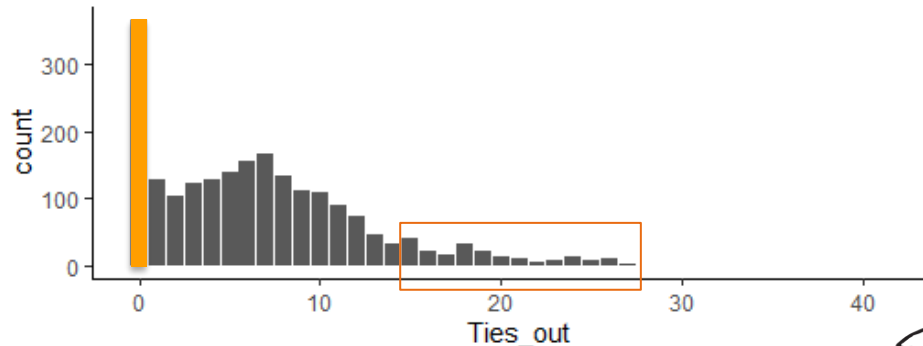
(Tudor-Locke et al., 2008: Revisiting "How Many Steps Are Enough?")

Sociometrics

Friendship nominations:
"Who are your friends in the classroom"

- Minimum of 1 peer
- Unlimited nominations
- Search field
- Outside of the class (excluded in this study)

Let the chopping begin!

Classrooms > 60% participation

                                                                    38 Classes

Investigate responses of the participants
     - non-reponse: 0 peers nominated in a wave
     - 'overchoosers': >80% of possible nominations in a wave
     - excluded classes for which >25% of the participants
         per wave this is the case   20 Classes

Convergence issues in RSiena (high deviations)

                                                                    13 Classes

Analytical Sample
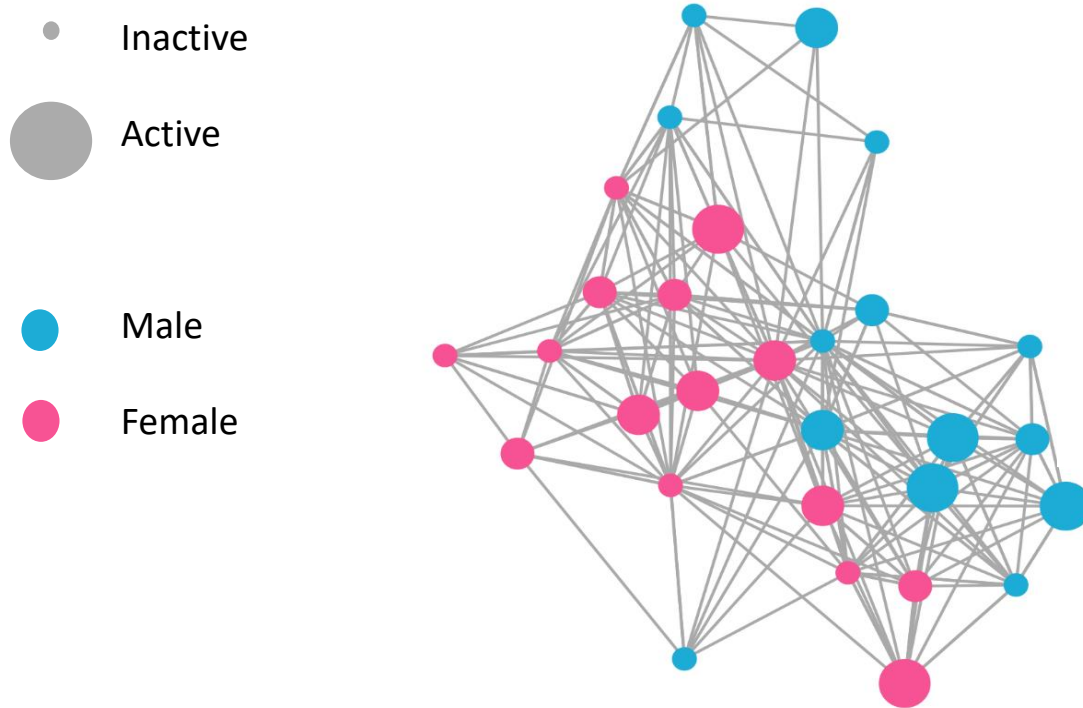
13 classes (8 primary & 5 secondary school)

N = 261

M age = 10.88 (*SD = 1.20.* range = 8-13)

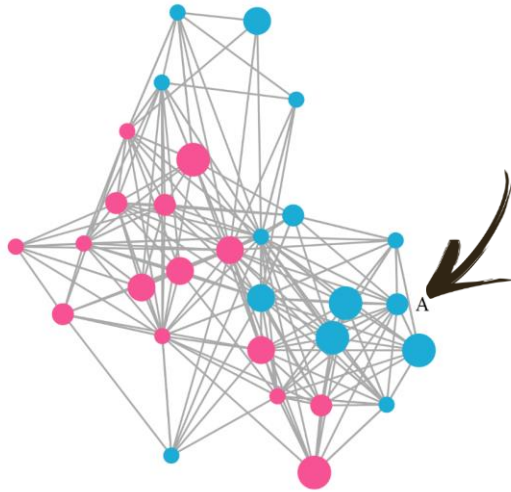47% Male

Mean BMI = 17.68 (*SD = 2.36).*   1.15% BMI>25

	Feb 2018	Apr 2018	Jun 2018
Social network	X	X	X
Physical activity	X	X	X

Changes in Network and Physical Activity

Inactive

Active

Male

Female

Changes in Network and Physical Activity

Changes in Network and Physical Activity
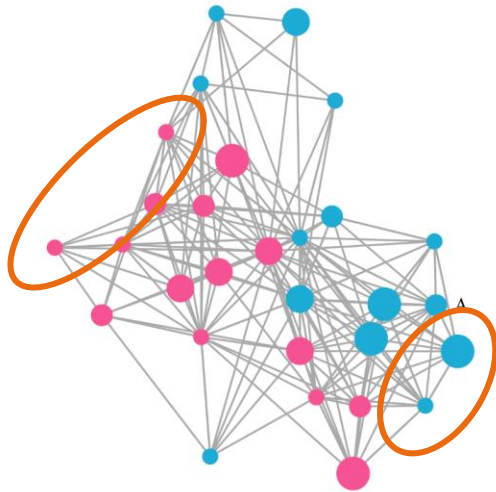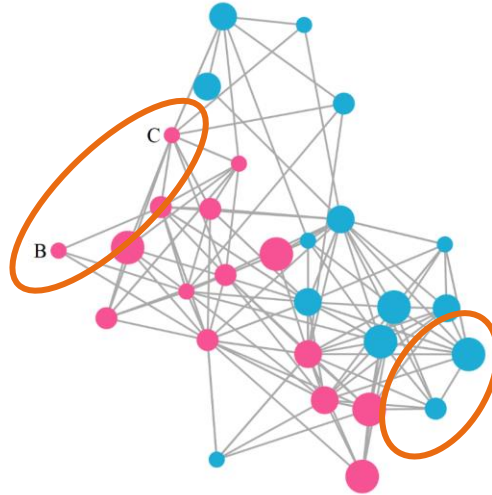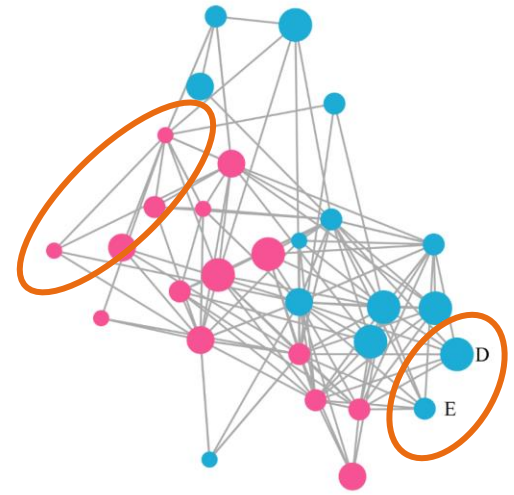
Sociometrics

Average out-degree = 6.84 *(SD = 5.59)*

	0 => 0	0 => 1	1 => 0	1 => 1	Jaccard
From w1 to w2	2556	266	310	1083	.65
From w2 to w2	2154	207	215	897	.68
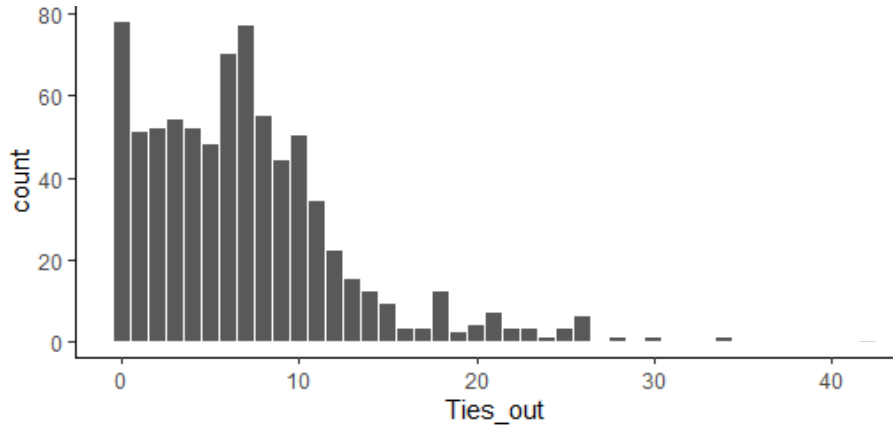
Physical Activity
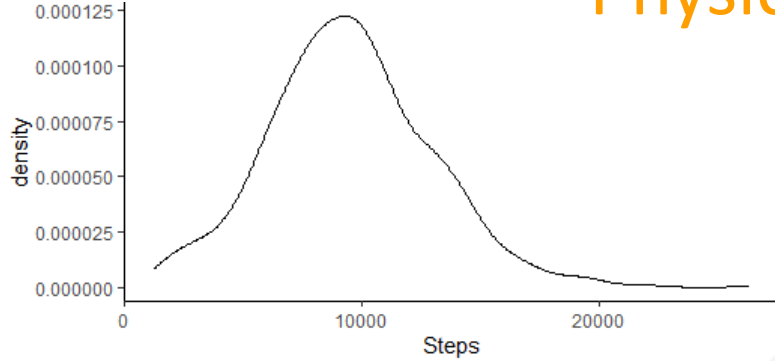
Category	Number of times
1	178
2	228
3	204
4	173

	Down	Up	Constant	Missing
From w5 to w6	56	103	102	0
From w6 to w7	94	50	117	0

From w5 to w6

	1	2	3	4
1	20	16	7	4
2	26	28	14	3
3	11	24	24	12
4	6	19	17	30

From w6 to w7

	1	2	3	4
1	24	25	9	10
2	11	27	22	10
3	9	12	32	18
4	3	7	8	34

Three approaches

A: Multi-group analysis

- Each class separate network

- Estimated effects the same across the networks

- One model (sienaGroupCreate())

B: Single network analysis

- All the classes are combined in one network

- Impossible ties are structural zero's

- Estimated effects the same across the networks

- One model (sienaDataCreate())

C: Meta analysis

- Each class separate network

- Each network is separately analyzed

- Estimated effects differ between the networks

- 13 models (one per class)

- Meta analysis of the selection and influence effects

A: Multi-group analysis

Base model

	Estimate	SE	T value
Network Dynamics			
outdegree (density)	-1.92	-0.07	-26.66*
reciprocity	1.76	-0.13	13.49*
transitive triplets	0.31	-0.02	14.30*
transitive recipr. triplets	-0.28	-0.03	-8.02*
PA alter	0.08	-0.05	1.68
PA ego	-0.01	-0.05	-0.15
PA ego x PA alter	0.19	-0.07	2.59*
Behavior Dynamics			
PA linear shape	-0.26	-0.08	-3.32*
PA quadratic shape	0.08	-0.03	2.30*
PA indegree	0.06	-0.02	2.91*
PA outdegree	-0.01	-0.02	-0.67
PA average alter	-0.09	-0.09	0.98

Selection

No Influence

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A: Multi-group analysis

Covariate model. pt 1

	Estimate	SE	T Value
Network Dynamics			
outdegree (density)	-2.00	0.11	-18.85*
reciprocity	1.71	0.18	9.61*
transitive triplets	0.31	0.03	10.8*
transitive recipr. triplets	-0.28	0.04	-6.37*
PA alter	0.04	0.05	0.69
PA ego	0.02	0.06	0.28
PA ego x PA alter	0.08	0.08	1.00
Sex alter	-0.05	0.07	-0.68
Sex ego	-0.05	0.07	-0.65
Sex ego x Sex alter	1.31	0.15	8.85*
Age alter	0.05	0.05	1.04
Age ego	0.02	0.05	0.4
Age ego x Age alter	0.00	0.03	0.05
BMI alter	-0.07	0.04	-2.06*
BMI ego	0.06	0.04	1.59
BMI ego x BMI alter	0.00	0.04	-0.01

No selection

Select others based on sex

Bigger increase in nominations for lower BMI

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A: Multi-group analysis

Covariate model. pt 2

	Estimate	SE	T Value
Behavior Dynamics			
PA linear shape	-0.27	0.12	-2.3*
PA quadratic shape	0.05	0.04	1.34
PA indegree	0.04	0.03	1.52
PA outdegree	0.00	0.03	0.1
PA average alter	0.14	0.12	1.13
PA: effect from Sex	-0.06	0.08	-0.74
PA: effect from Age	-0.07	0.03	-1.97*
PA: effect from BMI	0.01	0.05	0.28

No influence (next to PA average alter row)

Older PP less active (next to PA: effect from Age row)

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Goodness of Fit
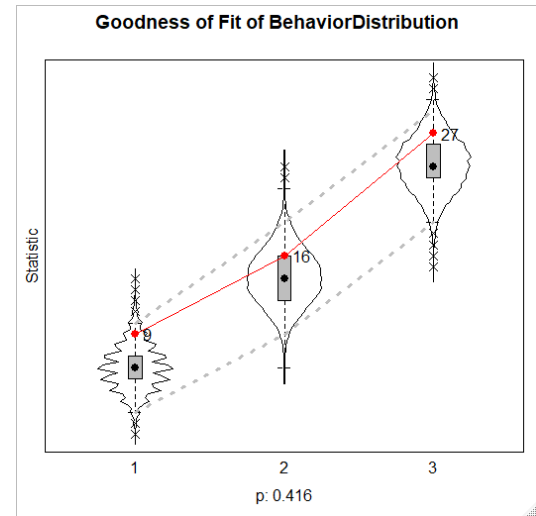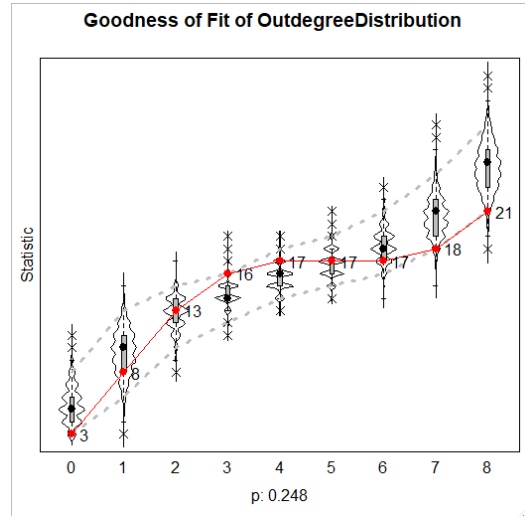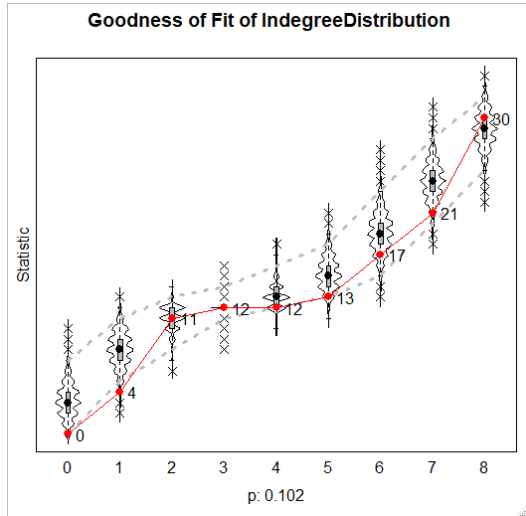
FEEL THE GOOD

B: Single network analysis

	Estimate	SE	T Value
Network Dynamics			
outdegree (density)	-2.68	0.16	-16.98*
reciprocity	2.61	0.28	9.18*
transitive triplets	0.59	0.08	7.49*
transitive recipr. triplets	-0.58	0.11	-5.33*
PA alter	0.01	0.08	0.15
PA ego	-0.02	0.09	-0.24
PA ego x PA alter	0.09	0.1	0.91
Sex alter	0.05	0.14	0.31
Sex ego	0.00	0.15	-0.01
Sex ego x Sex alter	1.57	0.28	5.69*
Age alter	0.02	0.08	0.29
Age ego	-0.01	0.08	-0.1
Age ego x Age alter	0.01	0.05	0.13
BMI alter	-0.11	0.07	-1.61
BMI ego	0.09	0.07	1.31
BMI ego x BMI alter	-0.07	0.07	-1.03

B: Single network analysis

	Estimate	SE	T Value
Behavior Dynamics			
PA linear shape	-0.1	0.07	-1.53
PA quadratic shape	0.09	0.04	2.01*
PA indegree	0.03	0.05	0.66
PA outdegree	0.00	0.05	0.1
PA average alter	0.05	0.11	0.51
PA: effect from Sex	0.02	0.08	0.21
PA: effect from Age	-0.07	0.04	-2.01*
PA: effect from BMI	0.01	0.04	0.17

Same result as the multi-group analysis

C: Meta analysis

Class	Estimate	SE	T Value
PA ego x PA alter			
261	-0.42	0.43	-0.98
258	-0.03	0.14	-0.23
298	0.33	2.26	0.15
263	-0.31	2.61	-0.12
301	0.31	0.64	0.48
256	-17.4	529	-0.03
310	-0.64	1.29	-0.5
303	0.67	1.27	0.53
302	-2.93	17.5	-0.17
82	1.39	2.22	0.63
279*	0.5	NA	NA
259	-4.2	87.4	-0.05
300*	0.16	0.32	0.49

```
Test that all parameters are 0 :
chi-squared =   2.4423, d.f. = 9, p = 0.964

Estimated mean parameter   -0.019 (s.e.   0.0922), two-sided p = 0.842
```

No selection

C: Meta analysis

Class	Estimate	SE	T Value
PA average alter			
261	0.62	1.24	0.5
258	0.36	0.85	0.43
298	0.26	3.26	0.08
263	-0.35	8.39	-0.04
301	-2.01	5.71	-0.35
256	-1.5	3.97	-0.38
310	-0.54	1.05	-0.52
303	-38.42	3793.84	-0.01
302	0.89	2.28	0.39
82	-0.11	1.17	-0.09
279*	2.66	NA	NA
259	10.73	335.9	0.03
300*	-1.87	12.76	-0.15

```
Test that all parameters are 0 :
chi-squared =   1.0112, d.f. = 7, p = 0.985

Estimated mean parameter   0.1072 (s.e.   0.2114), two-sided p = 0.630
```

No influence

Conclusion

Adolescents select each other based on physical activity ~~X~~ ~~X~~ Sex

No evidence for influence processes

Discussion

Some participants select the entire class as friends

Steps per day → also outside school
    Maybe less observable by peers

Exclude classes with individual convergence issues?

Contact

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🐦 @thabovw

🌐 https://www.tvanwoudenberg.com/

http://www.mymovez.eu/

http://www.movez-network.eu/ *VOL. 2*

https://easy.dans.knaw.nl/ui/datasets/id/easy-dataset:155345

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